CSC399: Selected Topics in CS
Fall Semester 2022

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Assignment (1)

1. An application specifies a requirement of 200 GB to host a database and other files. It also specifies that the storage environment should support 5,000 IOPS during peak workloads. The disks available for configuration provide 66 GB of usable capacity, and the manufacturer specifies that they can support a maximum of 140 IOPS. The application is response time sensitive, and disk utilization beyond 60 percent does not meet the response time requirements. Compute and explain the theoretical basis for the minimum number of disks that should be configured to meet the application requirements.

2. The average I/O size of an application is 64 KB. The following specifications are available from the disk manufacturer: average seeks time = 5 ms, 7,200 RPM, and transfer rate = 40 MB/s. Determine the maximum IOPS that could be performed with this disk for the application. Using this case as an example, explain the relationship between disk utilization and IOPS.

3. Refer to Question 2. Based on the calculated disk service time, plot a graph showing the response time versus utilization, considering the utilization of the I/O controller at 20 percent, 40 percent, 60 percent, 80 percent, and 100 percent. Describe the conclusion that could be derived from the graph.